THURSDAY, JULY 12, 1917.

ACIDS AND THE WAR.

The Manufacture of Sulphuric Acid and Alkali, with the Collateral Branches. A Theoretical and Practical Treatise. By Dr. G. Lunge. Fourth edition. Supplement to vol. i., *Sulphuric and Nitric Acid.* Pp. xii+347. (London: Gurney and Jackson, 1917.) Price 15*s.* net.

THE veteran professor emeritus of the Federal Technical University of Zürich would seem to be devoting his well-earned leisure almost exclusively to the emendation of those monumental treatises on chemical technology with which his name is so honourably associated. Scarcely four years have elapsed since he brought out the fourth edition of his well-known work on "The Manufacture of Sulphuric Acid and Alkali," and it has now become necessary to issue a supplementary volume dealing more particularly with sulphuric and nitric acids.

The crisis through which the world is now passing has led to an extraordinary extension in the manufacture of these substances. Here, as in other matters, necessity has been the mother of invention. Some old processes, it is true, have been resuscitated, but far more new and original ones have been devised. Some of these are only vaguely known, as, for obvious reasons, few details have been allowed to transpire. It is, of course, too soon to speak with confidence concerning their ultimate fate. The times are so utterly abnormal that all ordinary economic considerations are thrown aside. Sulphuric and nitric acids *must* be had; they are absolutely necessary to the national existence of all the belligerents, and if the usual sources of supply are not available or are insufficient, other or additional means must be found. To the nations which have more or less ready access to the sea the conditions are not so strenuous as they undoubtedly are to the Central Powers, and it is in the latter case that the new developments referred to have been most marked. Many outside sources of sulphur, pyrites, and nitrates were quickly cut off from Germany and Austria, and there is no doubt that at one period in the history of the war they were threatened with collapse owing to a shortage of these materials. The inventive genius of their chemists, however, would appear to have surmounted this crisis, and the world has been informed on high authority that Germany, and presumably also Austria, are no longer under any apprehension that the supply of their munitions is in jeopardy from this cause.

As regards these matters, it is scarcely to be expected that Dr. Lunge is able to afford much information. We shall have to wait for the conclusion of hostilities to learn what permanent changes have been effected in this branch of manufacturing chemistry in Central Europe. But, so far as can be foreseen, they will probably not be very profound, at least as regards principles. The stress of competition will tend, as hitherto, to approximate methods to a standard and practically uniform type. In this respect history will repeat itself. Under the pressure of necessity many processes have had to be adopted in war-time which are promptly abandoned when peace is resumed and the world's markets are once more available. At the same time experience gained under such conditions is bound to have a profound influence on the development of chemical technology. The war has had a tremendous "hustling" effect upon chemical manufactures of all kinds and in all countries in which this industry has any importance. All the portents go to show that the Germans are becoming nervously apprehensive that their pre-eminence in certain directions is now seriously assailed. There was a time when, for example, in the matter of synthetic dyestuffs, they treated the rest of the world with contemptuous indifference. The annual reports of such a powerful combination as the Badische Company are now couched in very different terms from those which prevailed prior to 1914. They no longer have an uncontrolled command of oversea markets, and they realise that fact.

Dr. Lunge's new volume is, as its title states, strictly supplementary. It corrects any errors which may have been detected in the last edition, and adds such new matter as may have been published in the ordinary technical journals since 1912-13, or which may have been communicated to the author from private sources. It consists practically of a series of notes, each of which starts with the number of the page in the main work to which the note refers, or to which it may be regarded as an appendix. In general arrangement, therefore, it follows strictly the plan of the larger work. Dr. Lunge is evidently a most assiduous reader of the literature of chemical technology, and nothing relating to those branches of manufacture with which he has been more immediately concerned seems to escape his notice. His study is a veritable clearing-house in regard to such subjects, and what he fails to note is probably scarcely worth noting. Indeed, if he errs at all, it is, perhaps, that his chronicle is too full; he occasionally notices, with a meticulous care, things which have no abiding place in technology, and which even the most receptive of practical men would willingly let die. Still, if it is a fault, it is an error in the right direction, which all who appreciate his zealous and long-continued services in the cause of chemical technology will gladly condone. T.

THE HEAT TREATMENT OF STEEL IN PRACTICE.

Steel and its Heat Treatment. By Denison K. Bullens. Second impression, with additions. Pp. vii+441. (New York: J. Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1916.) Price 17*s.* 6*d.* net.

THE heat treatment of steels is an art of recent growth. Twenty years ago it could scarcely be said to exist. Such as it was, it usually consisted in "heating to a red heat" for annealing,

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or perhaps the instructions called for "harden at a bright red and temper to a straw colour." It was an art guarded with much secrecy and confined chiefly to makers of tools. Pyrometers, structural changes, and a knowledge of the thermal equilibrium diagram of the steel in question were not even thought of. To-day it may be said without exaggeration that modern engineering practice at its best would be impossible were it not based largely upon an art which requires for its performance scientific knowledge, skill, and judgment of a very high order. With the exception of steels very low in carbon, there is scarcely one—certainly no alloy steel—which does not require a precisely defined heat treatment, depending upon the purpose to which it is to be put, if the best value is to be got out of it. Of this the steels used in the automobile industry furnish a conspicuous illustration. The frame, the front and rear axles, the steering parts, springs, crank-shafts, and gears, all have a more or less severe duty to perform and require steels possessing particular qualities of strength, toughness, resilience, endurance, shock resistance, and good wearing properties, which are obtained by suitable heat treatment.

Mr. Bullens has written a very serviceable book on the above subject, of which the first edition was quickly exhausted. The second edition, which we have before us, is a reprint of the first, with an appendix on the heat treatment of modern high-speed tool steels. The opening chapters deal with the testing and structure of steels, and the operations of annealing, hardening, tempering, and toughening. Then follow two on case-carburising and case-hardening, which are exceedingly good. The author has evidently studied Giolitti's researches with great profit to himself and turned the knowledge gained to practical account. An interesting illustration of cast-iron "growth" is furnished by his statement that this is an unsuitable material for case-carburising boxes, whereas malleable iron, soft steel, and wrought iron can all be used. The next two chapters, on the generation and application of heat, are also very valuable, and show the author's practical acquaintance with furnace design, construction, and operation.

The remainder of the book deals with the particular heat treatments in vogue for carbon and alloy steels. Among the latter, nickel, chromium, and nickel-chromium steels occupy an important place. Indeed, nickel steels were the pioneers among the alloy steels. Nickel was originally added merely to give increased strength and toughness over that obtained in ordinary rolled structural steel. When heat treatments were also applied they were found to enhance the valuable qualities of the alloys to such an extent that they soon came to hold, and still maintain, the premier position in alloy-steel metallurgy. The concluding chapters deal with vanadium, manganese, and silicon steels, and various types of tool steel.

The book is one to be warmly commended; it is well written and, on the whole, very accurate in its statements.

H. C. H. C.

SCHOOL AND PERSONAL HYGIENE.

(1) *Crowley's Hygiene of School Life.* By Dr. C. W. Hutt. Pp. xv+428. (London: Methuen and Co., Ltd.) Price 3*s.* 6*d.* net.

(2) *Syllabus of Personal Hygiene for Colleges.* By Prof. E. C. Howe. Third revision. Pp. 207. (Wellesley, Mass.: The Author.)

(1) DR. CROWLEY having accepted an appointment in the Medical Department of the Board of Education, the preparation of a second edition of his "Hygiene of School Life" has devolved upon Dr. Hutt, who has altered, extended, and rewritten where necessary much of the original work. Dr. Hutt has had the task of selecting from a vast amount of material to be found in official reports; this he has performed with good judgment, and his conclusions are sound and convincing.

The position taken in the book is that of the administrator who is limited by the various enactments dealing with the medical and hygienic problems concerned with education, and such subjects, therefore, as over-pressure, the curriculum, and the physiology of writing and of reading have, perforce, to be omitted. The contents include, in order, the physical condition of the child, classification and groups of school children, the infant and infants' schools, medical treatment of school children, the provision of school meals, baths, games and exercises, open-air education, the school and infectious diseases, and the school building. The book is illustrated with some plates and a number of diagrams and plans, and the price is exceedingly moderate.

From the point of view of the administrator who has to deal with things as they are, we do not think that the student of school hygiene can select a better guide than this second edition of Crowley's "Hygiene of School Life."

(2) Prof. Eugene Howe, of Wellesley College, Mass., gives in this book a syllabus of a course of personal hygiene suitable for the students of a general educational institution. The course is divided into thirty lectures. An abstract of each lecture is given, and the right-hand pages are left blank for notes by the student. At the end of the book a bibliography is added, under the various subjects dealt with, of works and papers suitable for further study. The subjects seem to be well chosen and the treatment of them satisfactory. While presumably intended for Prof. Howe's own students, those who may have to give courses of lectures in personal hygiene to lay audiences will find this book a suggestive and useful guide.

OUR BOOKSHELF.

The Elementary Principles of Wireless Telegraphy. By R. D. Bangay. Part ii. Second edition. Pp. viii+241. (London: The Wireless Press, Ltd., 1917.) Price 2*s.*

THE aim of this work is to explain the theory and practice of wireless telegraphy to persons who do

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